



SEQUENCE LISTING

<110> Hoechst Schering AgrEvo GmbH
LÖRZ, Horst
LÜTTICKE, Stephanie
ABEL, Gernot
GENSCHEL, Ulrich

<120> NUCLEIC ACID MOLECULES WHICH CODE FOR ENZYMES DERIVED FROM WHEAT AND WHICH ARE INVOLVED IN THE SYNTHESIS OF STARCH

<130> 514413-3849.1

<150> WO 99/58690
<151> 1999-11-18

<150> DE 198 20 608.9
<151> 1998-05-08

<150> 09/674,817
<151> 2000-11-06

<160> 11

<170> PatentIn version 3.1

<210> 1
<211> 2997
<212> DNA
<213> Triticum aestivum L. cv. Florida

<220>
<221> CDS
<222> (3)..(296)
<223>

<220>
<221> CDS
<222> (397)..(1617)
<223>

<220>
<221> CDS
<222> (2145)..(2960)
<223>

<400> 1
gg tcg ggg ccg gcg ccg cgc ctg cga cgg tgg cga ccc aat gcg acg
Ser Gly Pro Ala Pro Arg Leu Arg Arg Trp Arg Pro Asn Ala Thr
1 5 10 15

47

gcg ggg aag ggg gtc ggc gag gtc gcc gcg gtt gtc gag gcg gcg
Ala Gly Lys Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Ala Ala
20 25 30

95

acg aag gta gag gac gag ggg gag gag gac gag ccg gtg gcg gag gac Thr Lys Val Glu Asp Glu Gly Glu Asp Glu Pro Val Ala Glu Asp	35	40	45	143
agg tac gcg ctc ggc ggc gcg tgc agg gtg ctc gcc gga atg ccc gcg Arg Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Ala	50	55	60	191
ccg ctg ggc gcc acc gcg ctc gcc ggc ggg gtc aat ttc gcc gtc tat Pro Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr	65	70	75	239
tcc ggc gga gcc acc gcc gcg ctc tgc ctc ttc acg cca gaa gat Ser Gly Gly Ala Thr Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp	80	85	90	287
ctc aag gcg gtgggttgc ctcccgagta gagttcatca gctttgcgtg Leu Lys Ala				336
cgccgcgcgc ccctttttg ggcctgcaat ttaagtttg tactgggca aatgctgcag				396
gat agg gtg acc gag gag gtt ccc ctt gac ccc ctg atg aat cgg acc Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn Arg Thr	100	105	110	444
ggg aac gtg tgg cat gtc ttc atc gaa ggc gag ctg cac aac atg ctt Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn Met Leu	115	120	125	492
tac ggg tac agg ttc gac ggc acc ttt gct cct cac tgc ggg cac tac Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly His Tyr	135	140	145	540
ctt gat gtt tcc aat gtc gtg gtg gat cct tat gct aag gca gtg ata Leu Asp Val Ser Asn Val Val Asp Pro Tyr Ala Lys Ala Val Ile	150	155	160	588
agc cga ggg gag tat ggt gtt cca gcg cgt ggt aac aat tgc tgg cct Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys Trp Pro	165	170	175	636
cag atg gct ggc atg atc cct ctt cca tat agc acg ttt gat tgg gaa Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp Trp Glu	180	185	190	684
ggc gac cta cct cta aga tat cct caa aag gac ctg gta ata tat gag Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile Tyr Glu	195	200	205	732
atg cac ttg cgt gga ttc acg aag cat gat tca agc aat gta gaa cat Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val Glu His	215	220	225	780
ccg ggt act ttc att gga gct gtg tcg aag ctt gac tat ttg aag gag Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu Lys Glu	230	235	240	828

ctt gga gtt aat tgt att gaa tta atg ccc tgc cat gag ttc aac gag Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe Asn Glu 245 250 255	876
ctg gag tac tca acc tct tct tcc aag atg aac ttt tgg gga tat tct Leu Glu Tyr Ser Thr Ser Ser Lys Met Asn Phe Trp Gly Tyr Ser 260 265 270	924
acc ata aac ttc ttt tca cca atg aca aga tac aca tca ggc ggg ata Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly Gly Ile 275 280 285 290	972
aaa aac tgt ggg cgt gat gcc ata aat gag ttc aaa act ttt gta aga Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe Val Arg 295 300 305	1020
gag gct cac aaa cgg gga att gag gtg atc ctg gat gtt gtc ttc aac Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val Phe Asn 310 315 320	1068
cat aca gct gag ggt aat gag aat ggt cca ata tta tca ttt aag ggg His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe Lys Gly 325 330 335	1116
gtc gat aat act aca tac tat atg ctt gca ccc aag gga gag ttt tat Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu Phe Tyr 340 345 350	1164
aac tat tct ggc tgt ggg aat acc ttc aac tgt aat cat cct gtg gtt Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro Val Val 355 360 365 370	1212
cgt caa ttc att gta gat tgt tta aga tac tgg gtg acg gaa atg cat Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu Met His 375 380 385	1260
gtt gat ggt ttt cgt ttt gat ctt gca tcc ata atg acc aga ggt tcc Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg Gly Ser 390 395 400	1308
agt ctg tgg gat cca gtt aac gtg tat gga gct cca ata gaa ggt gac Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu Gly Asp 405 410 415	1356
atg atc aca aca ggg aca cct ctt gtt act cca cca ctt att gac atg Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile Asp Met 420 425 430	1404
atc agc aat gac cca att ctt gga ggc gtc aag ctc att gct gaa gca Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Ile Ala Glu Ala 435 440 445 450	1452
tgg gat gca gga ggc ctc tat caa gta ggt caa ttc cct cac tgg aat Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His Trp Asn 455 460 465	1500

gtt tgg tct gag tgg aat ggg aag tac cgg gac att gtg cgt caa ttc Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg Gln Phe 470 475 480	1548
att aaa ggc act gat gga ttt gct ggt ttt gcc gaa tgt ctt tgt Ile Lys Gly Thr Asp Gly Phe Ala Gly Phe Ala Glu Cys Leu Cys 485 490 495	1596
gga agt cca cac cta tac cag gtaagttgtg gcaatacttg taaatgagtt Gly Ser Pro His Leu Tyr Gln 500 505	1647
gagtgaatgt cacctggatt ttttatatat accacatgtat gatacacatc taaatata acaatcatag tgtatgcata tgcattggc taagaagtat tagtgtatac actagtgcata tatataggtt ttaacaccca acttgccat gaaggaacat agggcttct agttatctta tttatttgc cggtaataa tccactgaaa aattccagcc atgtcatttt ttaggggggg agaagaaaact atattgattt gccccctaa aagaagccat ctcagaattc ataggtaagt tgctttctg taaagaaaagg aaaacgactt catactttct atcggtgcta acttagctcg atgtatattt gtaagatgaa tgccaaattt aatttgcgg ataatttgcata ctgttattca caaatttcta tttggtttct ctagaaatca aaccagtaac ttgttattgg cactgcaact tcttatttgcata taatcag gca gga gga agg aaa cct tgg cac agt atc aac Ala Gly Arg Lys Pro Trp His Ser Ile Asn 510 515	1707 1767 1827 1887 1947 2007 2067 2127 2177
ttt gta tgt gca cat gat gga ttt aca ctg gct gat ttg gta aca tat Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp Leu Val Thr Tyr 520 525 530	2225
aat aag aag tac aat tta cca aat ggg gag aac aac aga gat gga gaa Asn Lys Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn Arg Asp Gly Glu 535 540 545	2273
aat cac aat ctt agc tgg aat tgt ggg gag gaa gga gaa ttc gca aga Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly Glu Phe Ala Arg 550 555 560	2321
ttg tct gtc aaa aga ttg agg aag agg cag atg cgc aat ttc ttt gtt Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg Asn Phe Phe Val 565 570 575 580	2369
tgt ctc atg gtt tct caa gga gtt cca atg ttc tac atg ggt gat gaa Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr Met Gly Asp Glu 585 590 595	2417
tat ggc cac aca aaa ggg ggc aac aac aat aca tac tgc cat gat tct Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr Cys His Asp Ser 600 605 610	2465
tat gtc aat tat ttt cgc tgg gat aaa aac gaa caa tac tct gag ttg	2513

Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln Tyr Ser Glu Leu			
615	620	625	
cac cga ttc tgc tgc ctc atg acc aaa ttc cgc aag gag tgc gag ggt			2561
His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys Glu Cys Glu Gly			
630	635	640	
ctt ggc ctt gag gac ttt cca acg gcc aaa cgg ctg cag tgg cat ggt			2609
Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu Gln Trp His Gly			
645	650	655	660
cat cag cct ggg aag cct gat tgg tct gag aat agc cga ttc gtt gcc			2657
His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser Arg Phe Val Ala			
665	670	675	
ttt tcc atg aaa gat gaa aga cag ggc gag atc tat gtg gcc ttc aac			2705
Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr Val Ala Phe Asn			
680	685	690	
acc agc cac tta ccg gcc gtt gtt gag ctc cca gag cgc gca ggg cgc			2753
Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu Arg Ala Gly Arg			
695	700	705	
cgg tgg gaa ccg gtg gtg gac aca ggc aag cca gca cca tac gac ttc			2801
Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala Pro Tyr Asp Phe			
710	715	720	
ctc acc gac gac tta cct gat cgc gct ctc acc ata cac cag ttc tcg			2849
Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile His Gln Phe Ser			
725	730	735	740
cat ttc ctc tac tcc aac ctc tac ccc atg ctc agc tac tca tcg gtc			2897
His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser Tyr Ser Ser Val			
745	750	755	
atc cta gta ttg cgc cct gat gtt tga gag acc aat ata tac agt aaa			2945
Ile Leu Val Leu Arg Pro Asp Val Glu Thr Asn Ile Tyr Ser Lys			
760	765	770	
taa tat gtc tat atg taa			2997
Tyr Val Tyr Met			
775			

<210> 2
 <211> 2997
 <212> DNA
 <213> Triticum aestivum L. cvFlorida

<400> 2			
ggtcggggcc ggcgcgcgcgc ctgcgcacgg tggcgcacccaa tgcgcacggcg ggaaagggggg			60
tcggcgaggt gtgcgcgcgc gttgtcgagg cggcgacgaa ggttagaggac gaggggggagg			120
aggacgagcc ggtggcggag gacaggtacg cgctcggcgg cgcgtgcagg gtgctcgccg			180
gaatgcccgc gcccgtggc gccaccgcgc tcgccccgg ggtcaatttc gccgtctatt			240

ccggcggagc	caccgcccgcg	g cogctctgcc	tcttcacgcc	agaagatctc	aaggcggtgg	300
ggttgcctcc	cgagtagagt	tcatcagctt	tgcggtcgcc	gcgcgcccct	tttttgggcc	360
tgcaatttaa	gttttgtact	ggggcaaatg	ctgcaggata	gggtgaccga	ggaggttccc	420
cttgacccccc	tgtatgaatcg	gaccggaaac	gtgtggcatg	tcttcatcga	aggcgagctg	480
cacaacatgc	tttacgggta	caggttcgac	ggcaccttg	ctcctcactg	cgggcaactac	540
cttgatgttt	ccaatgtcgt	ggtggatcct	tatgctaagg	cagtgataag	ccgaggggag	600
tatggtgttc	cagcgcgtgg	taacaattgc	tggcctcaga	tggctggcat	gatcccttctt	660
ccatatagca	cgttgattt	ggaaggcgcac	ctacctctaa	gatatcctca	aaaggacctg	720
gtaatataatg	agatgcactt	gcgtggattt	acgaagcatg	attcaagcaa	tgtagaacat	780
ccgggtactt	tcattggagc	tgtgtcgaag	cttgactatt	tgaaggagct	tggagttaat	840
tgtattgaat	taatgccttg	ccatgagttc	aacgagctgg	agtactcaac	ctcttcttcc	900
aagatgaact	tttgggata	ttctaccata	aacttctttt	caccaatgac	aagatacaca	960
tcaggcggga	taaaaaactg	tgggcgtgat	gccataaatg	agttcaaaac	ttttgtaaaga	1020
gaggctcaca	aacgggaaat	tgaggtgatc	ctggatgtt	tcttcaacca	tacagctgag	1080
ggtaatgaga	atggtccaaat	attatcattt	aagggggtcg	ataatactac	atactatatg	1140
cttgcaccca	agggagagtt	ttataactat	tctggctgt	ggaatacctt	caactgtaat	1200
catcctgtgg	ttcgtcaatt	cattgttagat	tgttaagat	actgggtgac	ggaaatgcat	1260
gtttaggtt	ttcggtttga	tcttgcattcc	ataatgacca	gaggttccag	tctgtggat	1320
ccagttaacg	tgtatggagc	tccaatagaa	ggtgacatga	tcacaacagg	gacaccttctt	1380
gttactccac	cacttattga	catgatcagc	aatgacccaa	ttcttgagg	cgtcaagctc	1440
attgctgaag	catggatgc	aggaggcctc	tatcaagtag	gtcaattccc	tcactggaat	1500
gtttggctcg	agtggaatgg	gaagtaccgg	gacattgtgc	gtcaattcat	taaaggcact	1560
gatggatttg	ctgggtgttt	tgccgaatgt	ctttgtggaa	gtccacacct	ataccaggta	1620
agttgtggca	atacttgtaa	atgagttgag	tgaatgtcac	ctggattttt	tatataacc	1680
acatgatgat	acacatctaa	atataataaca	atcatagtgt	atgcataatgc	atttggctaa	1740
gaagtattag	tgtatacact	agtgtatata	ataggtttta	acacccaact	tgccaatgaa	1800
ggaacatagg	gctttctagt	tatcttattt	atttgcgg	tgaataatcc	actgaaaaat	1860
tccagccatg	tcattttta	gggggggaga	agaaactata	ttgatttgcc	cccctaaaag	1920

aagccatctc agaattcata ggtaagttgc ttttctgtaa agaaaggaaa acgacttcat	1980
actttctatac ggtgcttaact tagctcgatg tatatttgc agatgaatgc caaatttaat	2040
ttgtcggata atttgatctg ttattcacaa atttctattt ggtttctcta gaaatcaaac	2100
cagtaacttg ttattggcac tgcaacttct tattgattaa tcaggcagga ggaaggaaac	2160
cttggcacag tatcaacttt gtatgtgcac atgatggatt tacactggct gatttggtaa	2220
catataataa gaagtacaat ttaccaaatg gggagaacaa cagagatgga gaaaatcaca	2280
atcttagctg gaattgtggg gaggaaggag aattcgcaag attgtctgtc aaaagattga	2340
ggaagaggca gatgcgcaat ttctttgttt gtctcatggt ttctcaagga gttccaatgt	2400
tctacatggg tcatgaatat ggccacacaa aagggggcaa caacaataca tactgccatg	2460
attcttatgt caattatccc cgctggata aaaaagaaca atactctgag ttgcaccgat	2520
tctgctgcct catgacccaaa ttccgcagg agtgcgaggg tcttggcctt gaggacttcc	2580
caacggccaa acggctgcag tggcatggtc atcagcctgg gaagcctgat tggctgaga	2640
atagccgatt cgttgccttt tccatgaaag atgaaagaca gggcgagatc tatgtggcct	2700
tcaacaccag ccacttaccg gccgttggc agctcccaga ggcgcaggg cgccgggtggg	2760
aaccgggtggt ggacacaggc aagccagcac catacgactt cctcaccgac gacttacctg	2820
atcgcgtct caccatacac cagttctcgc atttcctcta ctccaaacctc taccctatgc	2880
tcagctactc atcggtcatc ctagtattgc gccctgatgt ttgagagacc aatataatac	2940
gtaaaataata tgtctatataa taaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaa	2997

<210> 3
 <211> 764
 <212> PRT
 <213> *Triticum aestivum L. cv. Florida*

<400> 3

Ser	Gly	Pro	Ala	Pro	Arg	Leu	Arg	Arg	Trp	Arg	Pro	Asn	Ala	Thr	Ala
1															
															15

Gly	Lys	Gly	Val	Gly	Glu	Val	Cys	Ala	Ala	Val	Val	Glu	Ala	Ala	Thr
															30

Lys	Val	Glu	Asp	Glu	Gly	Glu	Glu	Asp	Glu	Pro	Val	Ala	Glu	Asp	Arg
															45

Tyr	Ala	Leu	Gly	Gly	Ala	Cys	Arg	Val	Leu	Ala	Gly	Met	Pro	Ala	Pro
															50

Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser
 65 70 75 80
 Gly Gly Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu
 85 90 95
 Lys Ala Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn
 100 105 110
 Arg Thr Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu His Asn
 115 120 125
 Met Leu Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly
 130 135 140
 His Tyr Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala
 145 150 155 160
 Val Ile Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys
 165 170 175
 Trp Pro Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp
 180 185 190
 Trp Glu Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile
 195 200 205
 Tyr Glu Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val
 210 215 220
 Glu His Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu
 225 230 235 240
 Lys Glu Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe
 245 250 255
 Asn Glu Leu Glu Tyr Ser Thr Ser Ser Lys Met Asn Phe Trp Gly
 260 265 270
 Tyr Ser Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly
 275 280 285
 Gly Ile Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe
 290 295 300
 Val Arg Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val
 305 310 315 320
 Phe Asn His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe
 325 330 335
 Lys Gly Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu
 340 345 350
 Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro
 355 360 365

Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu
370 375 380

Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg
385 390 395 400

Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu
405 410 415

Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile
420 425 430

Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Ile Ala
435 440 445

Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His
450 455 460

Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg
465 470 475 480

Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys
485 490 495

Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp
500 505 510

His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp
515 520 525

Leu Val Thr Tyr Asn Lys Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn
530 535 540

Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly
545 550 555 560

Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg
565 570 575

Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr
580 585 590

Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr
595 600 605

Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln
610 615 620

Tyr Ser Glu Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys
625 630 635 640

Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Lys Arg Leu
645 650 655

Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser
660 665 670

Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr
675 680 685

Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu
690 695 700

Arg Ala Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala
705 710 715 720

Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile
725 730 735

His Gln Phe Ser His Phe Leu Tyr Ser Asn Leu Tyr Pro Met Leu Ser
740 745 750

Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val
755 760

<210> 4
<211> 24
<212> DNA
<213> Zea mays

<400> 4
aaaggcccaa tattatcctt tagg

24

<210> 5
<211> 31
<212> DNA
<213> Zea mays

<400> 5
gccatttcaa ccgttctgaa gtcgggaagt c

31

<210> 6
<211> 2437
<212> DNA
<213> Triticum aestivum L. cv. Florida

<220>
<221> CDS
<222> (16)..(2304)
<223>

<400> 6

gaattcggca cgagg ccg gcg ccg cgc ctg cga cgg tgg cgg ccc aat gcg
Pro Ala Pro Arg Leu Arg Arg Trp Arg Pro Asn Ala
1 5 10

51

acg gcg ggg aag ggg gtc ggc gag gtc tgc gcc gcg gtt gtc gag gtg
Thr Ala Gly Lys Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Val
15 20 25

99

gcg acg aag gcc gag gat gag ggg gag gag gac gag ccg gtg gcg gag Ala Thr Lys Ala Glu Asp Glu Gly Glu Asp Glu Pro Val Ala Glu 30 35 40	147
gac agg tac gcg ctc ggc ggc gcg tgc agg gtg ctc gcc gga atg ccc Asp Arg Tyr Ala Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro 45 50 55 60	195
acg ccg ctg ggc gcc acc gcg ctc gcc ggc ggg gtc aat ttc gcc gtc Thr Pro Leu Gly Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val 65 70 75	243
tac tcc ggc gga gcc aca gcc gcg ctc tgc ctc ttc acg cca gaa Tyr Ser Gly Gly Ala Thr Ala Ala Leu Cys Leu Phe Thr Pro Glu 80 85 90	291
gat ctc aag gcg gat agg gtg acg gag gag gtt ccc ctt gac ccc ctg Asp Leu Lys Ala Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu 95 100 105	339
atg aat cgg act ggg aac gta tgg cat gtc ttc atc gaa ggc gag ctg Met Asn Arg Thr Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu 110 115 120	387
cag gac atg ctt tac ggg tac agg ttc gac ggc acc ttt gct cct cac Gln Asp Met Leu Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His 125 130 135 140	435
tgc ggg cac tac ctt gat gtt tcc aat gtc gtg gat cct tat gct Cys Gly His Tyr Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala 145 150 155	483
aag gca gtg ata agc cga ggg gag tat ggt gtt ccg gcg cgt ggt aac Lys Ala Val Ile Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn 160 165 170	531
aat tgc tgg cct cag atg gct ggc atg atc cct ctt cca tat agc acg Asn Cys Trp Pro Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr 175 180 185	579
ttt gat tgg gaa ggc gac cta cct cta aga tat cct caa aag gac ctg Phe Asp Trp Glu Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu 190 195 200	627
gta ata tat gag atg cac ttg cgt gga ttc acg aag cat gat tca agc Val Ile Tyr Glu Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser 205 210 215 220	675
aat gta gaa cat ccc ggt act ttc att ggg gct gtg tcg aag ctt gac Asn Val Glu His Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp 225 230 235	723
tat ttg aag gag ctt gga gtt aat tgt att gag tta atg ccc tgc cat Tyr Leu Lys Glu Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His 240 245 250	771

gag ttc aac gag ctg gag tac tca acc tct tct tcc aag atg aac ttt Glu Phe Asn Glu Leu Glu Tyr Ser Thr Ser Ser Ser Lys Met Asn Phe 255 260 265	819
tgg gga tat tct acc ata aac ttc ttt tca cca atg acg aga tac aca Trp Gly Tyr Ser Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr 270 275 280	867
tca ggc ggg ata aaa aac tgt ggg cgt gat gcc ata aat gag ttc aaa Ser Gly Gly Ile Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys 285 290 295 300	915
act ttt gta aga gag gct cac aaa cgg gga att gag gtg atc ctg gat Thr Phe Val Arg Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp 305 310 315	963
gtt gtc ttc aac cat aca gct gag ggt aat gag aat ggt cca ata tta Val Val Phe Asn His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu 320 325 330	1011
tca ttt agg ggg gtc gat aat act aca tac tat atg ctt gca ccc aag Ser Phe Arg Gly Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys 335 340 345	1059
gga gag ttt tat aac tat tct ggc tgt ggg aat acc ttc aac tgt aat Gly Glu Phe Tyr Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn 350 355 360	1107
cat cct gtg gtt cgt caa ttc att gta gat tgt tta aga tac tgg gtg His Pro Val Val Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val 365 370 375 380	1155
acg gaa atg cat gtt gat ggt ttt cgt ttt gat ctt gca tcc ata atg Thr Glu Met His Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met 385 390 395	1203
acc aga ggt tcc agt ctg tgg gat cca gtt aac gtg tat gga gct cca Thr Arg Gly Ser Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro 400 405 410	1251
ata gaa ggt gac atg atc aca aca ggg aca cct ctt gtt act cca cca Ile Glu Gly Asp Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro 415 420 425	1299
ctt att gac atg atc agc aat gac cca att ctt gga ggc gtc aag ctc Leu Ile Asp Met Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu 430 435 440	1347
gtt gct gaa gca tgg gat gca gga ggc ctc tatcaa gta ggt caa ttc Val Ala Glu Ala Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe 445 450 455 460	1395
cct cac tgg aat gtt tgg tct gag tgg aat ggg aag tac cgg gac att Pro His Trp Asn Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile 465 470 475	1443

gtg cgt caa ttc att aaa ggc act gat gga ttt gct ggt ggt ttt gcc Val Arg Gln Phe Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala 480 485 490	1491
gaa tgt ctt tgt gga agt cca cac cta tac cag gca gga gga agg aaa Glu Cys Leu Cys Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys 495 500 505	1539
cct tgg cac agt atc aac ttt gta tgt gca cac gat gga ttt aca ctg Pro Trp His Ser Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu 510 515 520	1587
gct gat ttg gta aca tat aat aac aag tac aat tta cca aat ggg gag Ala Asp Leu Val Thr Tyr Asn Asn Lys Tyr Asn Leu Pro Asn Gly Glu 525 530 535 540	1635
aac aac aga gat gga gaa aat cac aat ctt agc tgg aat tgt ggg gag Asn Asn Arg Asp Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu 545 550 555	1683
gaa gga gaa ttc gca aga ttg tct gtc aaa aga ttg agg aag agg cag Glu Gly Glu Phe Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln 560 565 570	1731
atg cgc aat ttc ttt gtt tgt ctc atg gtt tct caa gga gtt cca atg Met Arg Asn Phe Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met 575 580 585	1779
ttc tac atg ggt gat gaa tat ggc cac aca aaa ggg ggc aac aac aat Phe Tyr Met Gly Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn 590 595 600	1827
aca tac tgc cat gat tct tat gtc aat tat ttt cgc tgg gat aaa aaa Thr Tyr Cys His Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys 605 610 615 620	1875
gaa caa tac tct gac ttg cac cga ttc tgt tgc ctc atg acc aaa ttc Glu Gln Tyr Ser Asp Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe 625 630 635	1923
cgc aag gag tgc gag ggt ctt ggc ctt gag gat ttt cca acg gcc gaa Arg Lys Glu Cys Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Glu 640 645 650	1971
cgg ctg cag tgg cat ggt cat cag cct ggg aag cct gat tgg tct gag Arg Leu Gln Trp His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu 655 660 665	2019
aat agc cga ttc gtt gcc ttt tcc atg aaa gat gaa aga cag ggc gag Asn Ser Arg Phe Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu 670 675 680	2067
atc tat gtg gcc ttc aac acc agc cac tta ccg gcc gtt gtt gag ctc Ile Tyr Val Ala Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu 685 690 695 700	2115

ccg gag cgc aca ggg cgc cg ^g tgg gaa ccg gtg g ^t gac aca ggc aag Pro Glu Arg Thr Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys 705 710 715	2163
cca gca cca tac gac ttc ctc act gac gac tta cct gat cgc gct ctc Pro Ala Pro Tyr Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu 720 725 730	2211
acc ata cac cag ttc tct cat ttc ctc aac tcc aac ctc tac ccc atg Thr Ile His Gln Phe Ser His Phe Leu Asn Ser Asn Leu Tyr Pro Met 735 740 745	2259
ctc agc tac tca tcg gtc atc cta gta ttg cgc cct gat gtt tga Leu Ser Tyr Ser Ser Val Ile Leu Val Leu Arg Pro Asp Val 750 755 760	2304
gaggcgata tacagtaat aatatgtata tatgtagtcc tttggcgat tatcagtgtg cacaattgct ctattgccaa tgatctattc gatccacaga tacatgtgca aaaaaaaaaa aaaaaaaaactc gag	2364 2424 2437

<210> 7
<211> 762
<212> PRT
<213> *Triticum aestivum L. cv. Florida*

<400> 7

Pro Ala Pro Arg Leu Arg Arg Trp Arg Pro Asn Ala Thr Ala Gly Lys 1 5 10 15
Gly Val Gly Glu Val Cys Ala Ala Val Val Glu Val Ala Thr Lys Ala 20 25 30
Glu Asp Glu Gly Glu Glu Asp Glu Pro Val Ala Glu Asp Arg Tyr Ala 35 40 45
Leu Gly Gly Ala Cys Arg Val Leu Ala Gly Met Pro Thr Pro Leu Gly 50 55 60
Ala Thr Ala Leu Ala Gly Gly Val Asn Phe Ala Val Tyr Ser Gly Gly 65 70 75 80
Ala Thr Ala Ala Ala Leu Cys Leu Phe Thr Pro Glu Asp Leu Lys Ala 85 90 95
Asp Arg Val Thr Glu Glu Val Pro Leu Asp Pro Leu Met Asn Arg Thr 100 105 110
Gly Asn Val Trp His Val Phe Ile Glu Gly Glu Leu Gln Asp Met Leu 115 120 125
Tyr Gly Tyr Arg Phe Asp Gly Thr Phe Ala Pro His Cys Gly His Tyr 130 135 140

Leu Asp Val Ser Asn Val Val Val Asp Pro Tyr Ala Lys Ala Val Ile
 145 150 155 160
 Ser Arg Gly Glu Tyr Gly Val Pro Ala Arg Gly Asn Asn Cys Trp Pro
 165 170 175
 Gln Met Ala Gly Met Ile Pro Leu Pro Tyr Ser Thr Phe Asp Trp Glu
 180 185 190
 Gly Asp Leu Pro Leu Arg Tyr Pro Gln Lys Asp Leu Val Ile Tyr Glu
 195 200 205
 Met His Leu Arg Gly Phe Thr Lys His Asp Ser Ser Asn Val Glu His
 210 215 220
 Pro Gly Thr Phe Ile Gly Ala Val Ser Lys Leu Asp Tyr Leu Lys Glu
 225 230 235 240
 Leu Gly Val Asn Cys Ile Glu Leu Met Pro Cys His Glu Phe Asn Glu
 245 250 255
 Leu Glu Tyr Ser Thr Ser Ser Lys Met Asn Phe Trp Gly Tyr Ser
 260 265 270
 Thr Ile Asn Phe Phe Ser Pro Met Thr Arg Tyr Thr Ser Gly Gly Ile
 275 280 285
 Lys Asn Cys Gly Arg Asp Ala Ile Asn Glu Phe Lys Thr Phe Val Arg
 290 295 300
 Glu Ala His Lys Arg Gly Ile Glu Val Ile Leu Asp Val Val Phe Asn
 305 310 315 320
 His Thr Ala Glu Gly Asn Glu Asn Gly Pro Ile Leu Ser Phe Arg Gly
 325 330 335
 Val Asp Asn Thr Thr Tyr Tyr Met Leu Ala Pro Lys Gly Glu Phe Tyr
 340 345 350
 Asn Tyr Ser Gly Cys Gly Asn Thr Phe Asn Cys Asn His Pro Val Val
 355 360 365
 Arg Gln Phe Ile Val Asp Cys Leu Arg Tyr Trp Val Thr Glu Met His
 370 375 380
 Val Asp Gly Phe Arg Phe Asp Leu Ala Ser Ile Met Thr Arg Gly Ser
 385 390 395 400
 Ser Leu Trp Asp Pro Val Asn Val Tyr Gly Ala Pro Ile Glu Gly Asp
 405 410 415
 Met Ile Thr Thr Gly Thr Pro Leu Val Thr Pro Pro Leu Ile Asp Met
 420 425 430
 Ile Ser Asn Asp Pro Ile Leu Gly Gly Val Lys Leu Val Ala Glu Ala
 435 440 445

Trp Asp Ala Gly Gly Leu Tyr Gln Val Gly Gln Phe Pro His Trp Asn
 450 455 460
 Val Trp Ser Glu Trp Asn Gly Lys Tyr Arg Asp Ile Val Arg Gln Phe
 465 470 475 480
 Ile Lys Gly Thr Asp Gly Phe Ala Gly Gly Phe Ala Glu Cys Leu Cys
 485 490 495
 Gly Ser Pro His Leu Tyr Gln Ala Gly Gly Arg Lys Pro Trp His Ser
 500 505 510
 Ile Asn Phe Val Cys Ala His Asp Gly Phe Thr Leu Ala Asp Leu Val
 515 520 525
 Thr Tyr Asn Asn Lys Tyr Asn Leu Pro Asn Gly Glu Asn Asn Arg Asp
 530 535 540
 Gly Glu Asn His Asn Leu Ser Trp Asn Cys Gly Glu Glu Gly Glu Phe
 545 550 555 560
 Ala Arg Leu Ser Val Lys Arg Leu Arg Lys Arg Gln Met Arg Asn Phe
 565 570 575
 Phe Val Cys Leu Met Val Ser Gln Gly Val Pro Met Phe Tyr Met Gly
 580 585 590
 Asp Glu Tyr Gly His Thr Lys Gly Gly Asn Asn Asn Thr Tyr Cys His
 595 600 605
 Asp Ser Tyr Val Asn Tyr Phe Arg Trp Asp Lys Lys Glu Gln Tyr Ser
 610 615 620
 Asp Leu His Arg Phe Cys Cys Leu Met Thr Lys Phe Arg Lys Glu Cys
 625 630 635 640
 Glu Gly Leu Gly Leu Glu Asp Phe Pro Thr Ala Glu Arg Leu Gln Trp
 645 650 655
 His Gly His Gln Pro Gly Lys Pro Asp Trp Ser Glu Asn Ser Arg Phe
 660 665 670
 Val Ala Phe Ser Met Lys Asp Glu Arg Gln Gly Glu Ile Tyr Val Ala
 675 680 685
 Phe Asn Thr Ser His Leu Pro Ala Val Val Glu Leu Pro Glu Arg Thr
 690 695 700
 Gly Arg Arg Trp Glu Pro Val Val Asp Thr Gly Lys Pro Ala Pro Tyr
 705 710 715 720
 Asp Phe Leu Thr Asp Asp Leu Pro Asp Arg Ala Leu Thr Ile His Gln
 725 730 735
 Phe Ser His Phe Leu Asn Ser Asn Leu Tyr Pro Met Leu Ser Tyr Ser
 740 745 750

Ser Val Ile Leu Val Leu Arg Pro Asp Val
755 760

<210> 8
<211> 20
<212> DNA
<213> *Triticum asetivum L. cvFlorida*

<400> 8
gctttacggg tacaggttcg 20

<210> 9
<211> 18
<212> DNA
<213> *Triticum asetivum L. cvFlorida*

<400> 9
gctttacggg tacaggtt 18

<210> 10
<211> 51
<212> DNA
<213> *Triticum asetivum L. cvFlorida*

<400> 10
gcggtagctc tagaaggaga tatacatatg gcggaggaca ggtacgcgct c 51

<210> 11
<211> 33
<212> DNA
<213> *Triticum asetivum L. cvFlorida*

<400> 11
gctcgagtcg actcaaacat cagggcgcaa tac 33